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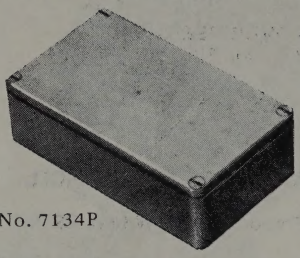

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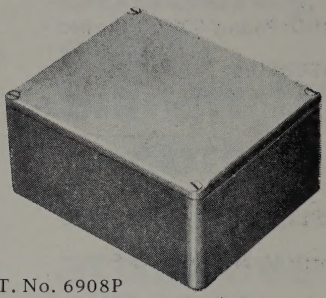

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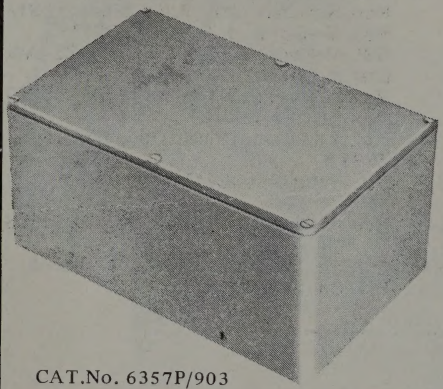

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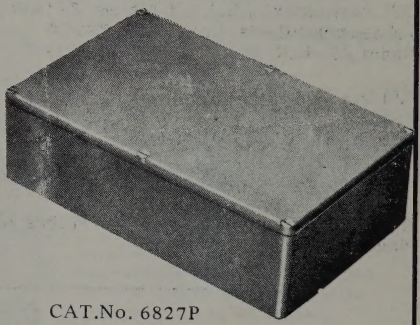

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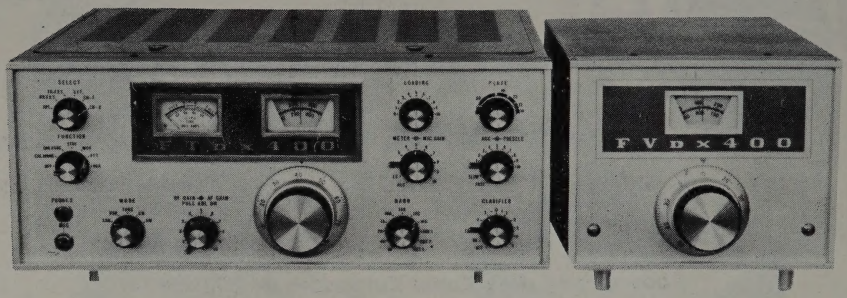

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USING THE GRID-DIP METER

Part II of this short series presents "How To" information on using the ubiquitous G.D.O. around the ham shack.

BY WILFRED M. SCHERER, W2AEF

With acknowledgements to CQ.

Part II

Applications

A shunt resistor used for broadbanding or swamping may have the same effect and require removal. Transistors, too, may heavily load a circuit and therefore might have to be removed, before the resonant dip will be indicated. Where this has been necessary, the subsequent resonant frequency will be altered, depending on the capacitive effect of the transistor.

Receiver Circuits: In the case of a receiver, the tuned circuits should be resonated to the desired frequency as indicated by the g.d.o. function. Gang-tuned circuits should be aligned for bandspreading and tracking by checking for resonance at each end of the range as well as at one or two places in between. Methods of electrically obtaining bandspread and tracking may be found in radio textbooks.

After this procedure, power may be applied to the receiver and the instrument employed as a signal generator for checking the final alignment. A very short antenna should be connected to the receiver input and the instrument should be placed on the bench away from nearby conductors and where body movements are least apt to affect the r.f. signal from it. If, during the procedure, the signal is too strong producing overload or spurious birdies, the antenna should be cut down or the instrument placed farther away or the receiver gain reduced.

The receiver S-meter or a v.t.v.m. at the detector will have to be used as the level indicator. The a.f. output may be used if the grid-dip meter is modulated. This can be done with the application of tone into the phone jack of the instrument.

Where a superheterodyne-type of receiver is involved, it may be necessary to first align the i.f. system, in which case the g.d.o. inductor should be positioned near the input lead for the i.f. system. This can also be done where one stage at a time must be checked, including mixer and r.f. stages.

If, after the i.f. strip is working, the set fails to function, the cause may be due to a defect in the heterodyning oscillator or v.f.o. This can be checked by using the instrument either as a diode or an oscillating detector to find out if the receiver oscillator is working and at what frequency. On the other hand, if a malfunction is suspected in this area, the instrument as a signal generator may be temporarily substituted for the receiver oscillator by coupling it near the input of the particular mixer.

Transmitter Circuits: Using the instrument as a g.d.o., the tank circuits may be adjusted to the desired frequency, similarly following the procedures used with receiver circuits. Any output load should be removed from the p.a. tank when this stage is checked.

After these steps, connect the output load (preferably a dummy load), apply power and touch up the alignment according to the meter readings and power output. If the equipment fails to function, the individual stages may be checked for r.f. power in the associated tank circuits, also making sure it is at the correct frequency. This can be done using the instrument either as a diode or an oscillating detector. Search also may be made thereby for harmonics or spurious signals, such as mixing products as often experienced with multiple-conversion transmitters. The oscillating detector will be more sensitive for this work. While doing so, care must be taken to avoid coming in contact with high voltages that may be present at the test circuits.

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ACY28		45-150	-12	-1·0	1·1	≤-12	-30	-40	-20	75	0·2	Audio oscillators and Amplifiers
ASY51	OC77	30-125	0†	-10	≥0·5	—	—	-60	-20	75	0·15	High Voltage switching and Relay control.
ASY54	TK30D	15-95	-0·2	-100	6·0	≤-10	-20	-30	-15	75	0·2	High Voltage Medium Speed logic.
ASY56		25-60	0†	-10	≥2·0	≤-10	-16	-15	-10	75	0·2	Medium Speed logic.
ASY57		30-80	0†	-10	≥3·7	≤-10	-16	-15	-10	75	0·2	do do do
ASY58	CV7048	60-150	0†	-10	≥12·0	≤-10	-16	-15	-10	75	0·2	
ASY60		95-125	-0·15	-100	11·0	≤-5·0	-9	-20	-8	75	0·2	Track Switching in drum Stores
ASY63		25-100	-0·1	-3	—	≤-10	-30	-36	+8	75	0·2	Medium Speed T.D.M. systems
ASY66		15-95	-0·15	-100	6·0	≤-5·0	-9	-16	-16	75	0·2	Two Way Simultaneous Signal transmissions.

Data Summary of Transistors as Advertised in Radio ZS. zs1ca

BEFORE continuing with a discussion on the applications of the grid-dip meter, some procedures, not mentioned previously, will be taken up.

When the g.d.o. is to be coupled to large-diameter inductors made with heavy conductors such as tubing, it may be necessary to position the g.d.o. inductor inside the end of the test inductor and next to the inside edge of the conductors.

In applications where the instrument is used as an oscillating detector, due to the circuit loading when the tube then functions as a diode, the meter response will be relatively broad. The frequency calibration also will shift slightly to a lower-frequency dial reading than with g.d.o. operation.

Besides producing a response in headphones, the meter will tend to kick upward with the signal as it is tuned in during operation as an oscillating detector. Both the meter and headphone response will be extremely sharp, necessitating slow and careful tuning.

Applications

Neutralization: Remove *plate* power from the transmitter. Using the instrument as a g.d.o., couple it to the driver of the stage to be neutralized and tune it for a dip. Leave the instrument set with the meter deflected at the bottom of the resonant dip and adjust the neutralizing control so that tuning the plate tank of the neutralized stage through resonance has no reaction on the deflected meter reading. Each time the neutralizing setting has been changed, a new resonant dip may have to be first located, before the check is made by tuning the p.a. tank.

Another method is to remove plate power from only the stage to be neutralized. Apply power to the driver stages and with the instrument used as a diode detector tuned to the operating frequency, couple it to the amplifier tank and check for an indication of r.f. Adjust the neutralizing control until no or a minimum indication of r.f., is observed according to the detector meter reading.

Parasitic Oscillations: Use instrument as either a diode or an oscillating detector coupled to the unstable circuit to find the frequency of the oscillations. It may be observed that during such searching with diode detection, that the meter reads at the high-frequency end of the range, regardless of which instrument inductor is in place. This is due to the very low C at this point which with the diode loading lowers the Q and broadens the response. It is particularly noticeable with v.h.f. parasitics. The looked-

for frequency is not indicated, unless the meter reading peaks somewhere in the range.

When the parasitic frequency has been determined, remove power from the equipment and using the instrument as a g.d.o. to locate circuits or components, such as r.f. chokes, wiring, etc. that are resonant at the parasitic frequency. Steps taken to alter such resonances may cure the oscillations.

One cause of parasitics may be cavity resonance produced by the chassis on which the equipment is built. This usually can be found by the g.d.o. function with coupling made in one corner of the chassis interior. Detuning the chassis by means of a bar or partition shield inside the chassis has been found to cure such difficulties.

Parasitics may occur even in receivers as may be evidenced by birdies (other than oscillation due to instability at the operating frequency) as a circuit is tuned. We had one case where a check with the grid-dip meter as a detector indicated that the oscillations did not take place at the operating frequency, eliminating the possibility of r.f. feedback, but rather occured at a very high frequency. This was due to the capacitance of the antenna trimmer and the inductance of its connecting lead to the bandswitch that produced resonance at the high frequency (as learned with the g.d.o.) that introduced the parasitic oscillations. A change in the lead length corrected the difficulty.

Parallel-Resonant Traps: Use instrument as a g.d.o. Traps usually are best pretuned or checked prior to installation in a circuit or with at least one circuit lead disconnected, since under some conditions wiring or other elements involved in the associated circuit may introduce additional shunt capacitance or inductance and produce a resonance indication other than that of the trap itself or prevent a dip indication at the actual resonant frequency of the trap alone.

If the circuit "strays" and their Q are small in comparison with the trap values, chances are that they will not seriously affect the dip readings, in which case checks made with the trap installed will be approximately correct.

Final precise adjustment should be made by applying power to the circuit and tuning the trap for the desired effect under actual operating conditions.

Series-Resonant Traps: Use g.d.o. in similar procedure as with parallel-resonant traps, but where resonance is to be checked prior to installation, the trap must be first connected as a parallel circuit. At high frequencies or where the trap inductance is low, the lead making the parallel connection should be a short heavy conductor to keep its inductance low and leads to be used for installation connections also must be included with this setup.

Harmonics: Harmonics may be checked using the instrument as either a diode or oscillating detector coupled to the tank circuits or other elements of interest. Except where such harmonics are relatively strong, indications may not be found with the grid-dip meter, particularly energy produced by stray radiation from the equipment that may cause TVI; but in any case, where a particular harmonic is known to create trouble, the cause of its production due to faults in the transmitter often may be tracked down using the g.d.o. to locate circuit resonances that could encourage harmonic production.

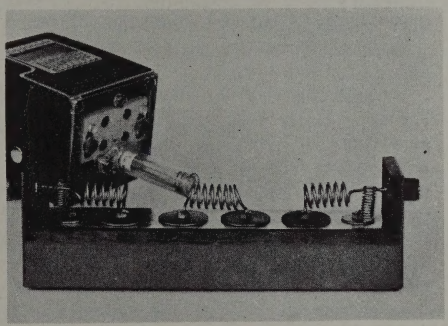
Low-, high-, and band-pass r.f. filters may be checked using the g.d.o.

For a single low- or high-pass constant-K Pi-section, disconnect it from associated circuitry. Use of the g.d.o. coupled to the inductor (for a low pass filter) or *one* of the inductors (for a high pass filter) will indicate the cutoff frequency.

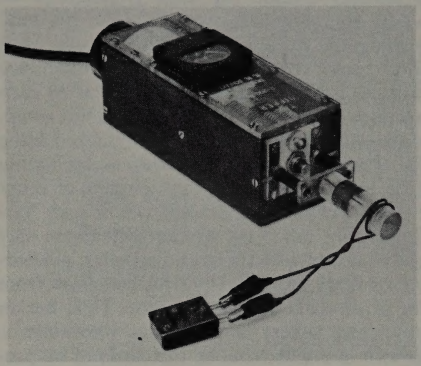
For a single low-, or high-pass constant-K T-section filter, short-circuit the input and output. Follow a similar procedure as above.

For multi-section filters using constant-K and M-derived sections, the cutoff frequency may be found with the g.d.o. coupled to an "untuned" series inductor (in a low pass filter) or a similar shunt inductor (in a high pass filter) at one of the mid sections.

If the capacitive and inductive values are known or designated for a particular section,



G.d.o. coupled to center section of low-pass filter for determining filter cutoff frequency.



G.d.o. coupled with loop attached to crystal-holder pins for checking overtone activity of crystal.

the g.d.o. may be helpful for checking the proper resonant frequency thereat as predetermined by calculation or the use of an *L/C* resonance chart or nomograph. This can be particularly helpful during filter construction, as illustrated on page 16 in *CQ* for March, 1967.

Checking Crystals: Plug crystal into grip-dip meter in place of the instrument inductor. This may require the use of a jig or short leads equipped with clips or banana plugs. Use the instrument in the oscillate mode. Rotate the tuning capacitor until grid current is indicated, the value of which at a given capacitor setting for various crystals will indicate the relative activity of the crystals. Oscillation is best obtained near a low-capacitance setting (toward h.f. end of scale).

This also is necessary when the crystal frequency is to be determined by checking the oscillator signal with a calibrated receiver, since most crystals are rated for a load capacitance of about 33 mmf.

Crystals also may be checked for activity and *approximate* frequency by making a one or two-turn loop around the g.d.o. inductor with a short lead the ends of which may be clipped to the pins of the crystal holder. The g.d.o. will indicate a sharp dip when tuned through the crystal frequency (with the appropriate inductor in use). This is useful for overtone crystals with which the overtone frequencies also will be indicated. The fundamental and overtones of many other crystals also will be found.

In some cases the dip may occur at two slightly different frequencies, depending on whether or not the g.d.o. is tuned starting above or below the crystal frequency. In such cases split the difference between the two readings.

This method is handy for use where even the range in which the crystal frequency falls is not known. After this has been determined, a much more accurate frequency check may be had by plugging the crystal directly into the g.d.o. and checking the signal with a receiver as described above.

Field Strength Meter: Use instrument as a diode detector with a short antenna connected to one inductor terminal or to a one or two turn loop wound around the inductor with the other end of the loop grounded to the instrument case. The frequency calibration might thereby be altered somewhat, but for this application the requirement is only to tune for a maximum meter reading. This is indicative of the signal strength.

R. F. Chokes: The *parallel* resonances of r.f. chokes may be checked using the g.d.o. coupled to the choke with both its leads open.

The *series* resonance is similarly checked, but with the leads of the choke connected together.

Where the choke is the single solenoid type, it may be better to check it while it is installed in the place where it is to be used. The end nearer ground may be connected, but the "hot" end should be left floating.

Self Resonance of Inductors: This actually is the same proposition as r.f. chokes and may be treated as such, but there are some additional aspects which sometimes crop up. These involve a tuned circuit where the inductor is tapped for operation on different ranges.

Self resonances in the unused, and sometimes in the used, portion of the inductor may introduce adverse effects on the operation of the equipment, such as signal suckout, parasitics, instability, harmonics, etc. This may occur either if the unused turns are shorted or left open. Using the g.d.o. for checking such resonances can be helpful in tracking down difficulties.

Quantitative Measurements

A number of quantitative measurements may be made with the grid-dip meter as follows:

Capacitance Measurement: Use the g.d.o. to find the resonant frequency with the unknown capacitance connected across an inductance

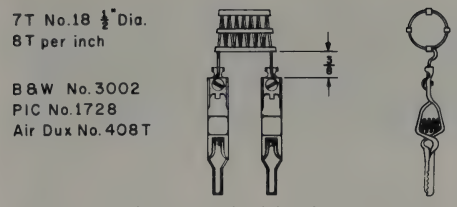


Fig. 1—Test inductor standard for determining capacitance when used in conjunction with a grid dip meter and either a calibration chart (fig. 2) or the formula described in the text.

of known value. The capacitance then may be found from $C_x = \frac{1}{4\pi^2 f^2 L}$ where f is the resonant frequency in megacycles, L is the inductance in micro-henries, C is the capacitance in micro-farads. If known, the distributed capacitance of the inductor should be subtracted from the result. Many manufacturers of grid-dip meters specify the values of the inductors for the instrument or provide a calibration chart for utilizing the instrument inductors to determine the capacitance *vs.* resonant frequency with each one. A small jig or short leads equipped with clips may be set up for connecting the capacitor to an inductor.

A do-it-yourself expedient that can easily be set up and one which we've found more handy and convenient, is one individual test-inductor standard made up of 7 turns of a B & W #3002 Miniductor equipped with alligator clips as shown at fig. 1.

This one inductor will permit a continuous frequency coverage of 2.4—80 mc to be used for capacitance measurements of 10 mmf to .01 mf as indicated by the calibration chart at fig. 2.

The distributed capacitance of the inductor is very low, and thus will introduce a negligible error, leaving the accuracy primarily up to the g.d.o. calibration.

This inductor also exhibits a very high Q, often making it possible to obtain a measurement on a capacitor actually installed in a circuit. In any case, the inductor should be clipped on as near the capacitor body as possible in order to avoid additional inductance from the capacitor leads.

Inductance Measurement: This will be limited to r.f. inductors. Connect a capacitor of known value across the inductor (using as short leads as possible) and use the g.d.o. to

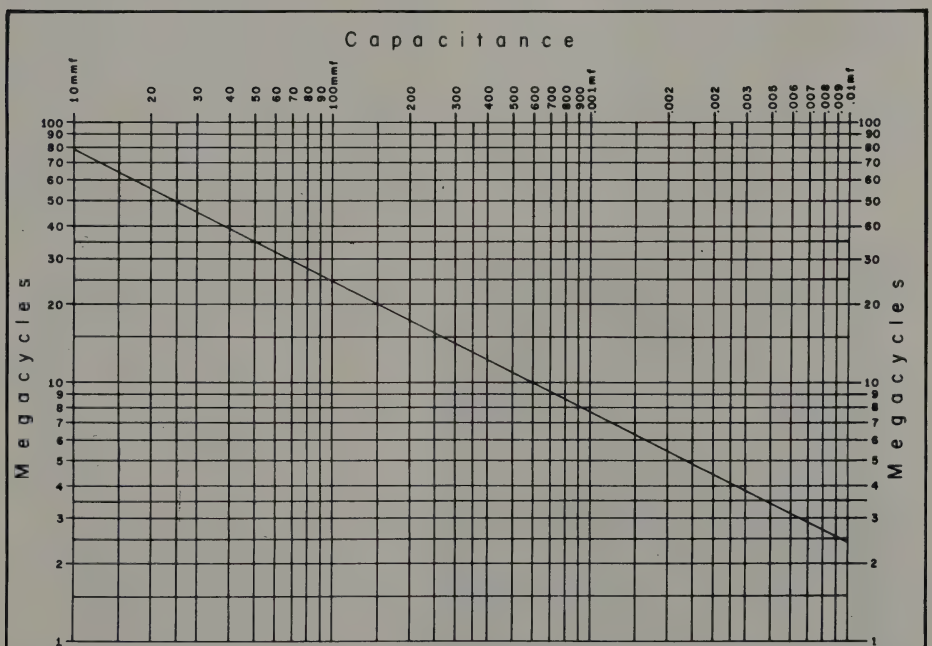


Fig. 2—Calibration chart for capacitance measurements with the g.d.o. using the clip-on inductor described at fig. 1. Accuracy depends on g.d.o. calibration and self-inductance of capacitor. Distributed capacitance of the inductor is about 1.5 mmf.

find the resonant frequency of the combination. The inductance then is $L_X = \frac{1}{4\pi^2 f^2 C}$, where L is the inductance in micro-henries, f is the frequency in megacycles, C is the capacitance in micro-farads; or reference may be made to an L/C resonance chart.

Due to the distributed capacitance of the inductor, a slight error will result, however, if the value of the capacitor is quite high, the error will be negligible. The capacitor itself also should exhibit a low inductance.

Resonant Frequency of Capacitors: Connect capacitor leads together and use g.d.o. coupled to the partial loop formed by the leads.

Finding the resonant frequency of a capacitor often is helpful in determining its effectiveness with bypassing for TVI reduction in equipment.

An interesting experience we ran across with capacitor resonance involved a case where grid drive over a narrow range in the 14 mc band faded away. The culprit, as found with the g.d.o., was a ceramic bypass in a 7 mc doubler stage which heated sufficiently to gradually shift its resonant frequency to smack on the doubler frequency and cause a suckout of the signal.

Circuit Q: Use instrument as a signal generator. Connect v.t.v.m. with r.f. probe across the circuit to be measured. Couple the grid-dip meter to the circuit and tune the instrument for a maximum reading on the v.t.v.m. This is where the circuit is resonant. Note the frequency at which this occurs. Then tune the instrument each side of resonance to the points where the v.t.v.m. reading drops 70.7% of that at resonance. Note the frequency at these two points and calculate the circuit Q from $Q = f_r \div \Delta f$ where f_r is the resonant frequency and Δf is the difference between the two off-resonance frequencies just found.

The coupling of the grid-dip meter should initially be made so that a convenient reading at circuit resonance is obtained on the v.t.v.m. The coupling then should be left fixed for the remainder of the operation. In order to minimize circuit loading, it would be advisable to couple the v.t.v.m. to the circuit with as small size capacitor as possible while still obtaining a reading.

When the circuit Q is quite high, it may be necessary to check the grid-dip meter frequencies with a calibrated receiver, since the off-resonance points will appear too closely together for an accurate reading on the instrument scale.

Relative Circuit Q at a given frequency: Use the g.d.o. and observe whether the dip is sharp or broad (with a given sensitivity adjustment on the g.d.o.). The sharper the dip, the higher the Q. The relative Q will vary between circuits at different frequencies due to differences in circuit values, as well as due to the changes in the inherent sharpness of the g.d.o. dip, since its Q tends to drop at the h.f. end of each range.

The conclusion of this series will be made with Part III which will cover applications relating to transmission lines and antennas. ■

RADIOSTASIE FOTO-KOMPETISIE

ZS6YQ

Bushy Roode

SILIKON-BEHEERDE GELYKRIGTERS EN TRIACS

deur J.P. Hesp, Randse Afrikaanse Universiteit, ZS6AJS.

Daar verskyn feitlik daagliks nuwe halfgeleidende elemente op die mark en is dit dikwels moeilik om tred te hou met die nuwe ontwikkelings.

So ontstaan die vraag wat silikon-beheerde gelykrigters (SBG) en TRIACS is. In hierdie kort oorsig sal ons eers kyk hoe hulle werk en daarna sal 'n paar eenvoudige toepassings gegee word.

Die SBG (in Engels "Silicon Controlled Rectifier", SCR) is 'n diode wat beheer kan word. Die konstruksie van hierdie halfgeleier word in fig. 1 skematies aangetoon. Vier lae halfgeleidende skyfies (silikon) word saamgevoeg soos in die figuur aangetoon. Die volgorde word so gekies dat wanneer dit nie geleidend is nie, punte 1 en 3 na willekeur positief of negatief gekies kan word.

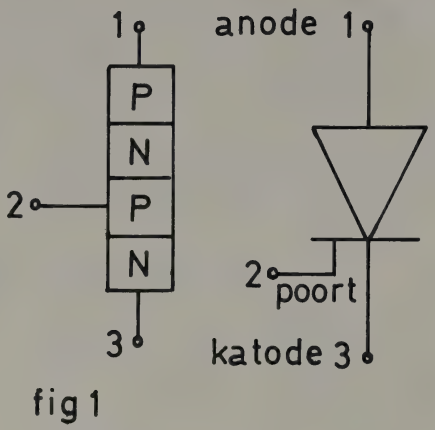


fig 1

Wanneer 'n positiewe poortspanning op punt 2 aangelê word en punt 1 positief is met betrekking tot punt 3, sal die SBG gelei en nie af skakel nie, al word die poortspanning positief of negatief gemaak. Dit kan alleen gedoen word deur die stroom tussen anode en katode te onderbreek. Hierdie onderbreking kan geskied deur die stroomrigting om te keer of the SBG kort te sluit.

'n Baie eenvoudige manier om dit te doen is om die SBG aan 'n wisselspanning (fig. 2a) te koppel. Omdat die wisselspanning sê 50 maal per sekonde van negatief tot positief omskakel sal die SBG outomaties met elke negatiewe siklus afgeskakel word.

As die poort nou op tydstip T. (fig 2b) wanneer die wisselspanning van negatief na positief gaan 'n positiewe puls ontvang, sal die SBG weer geleidend word. Omdat die SBG net die positiewe helfte van die wisselspanning deurlaat is dit dus moontlik om met behulp van die SBG die positiewe helfte van die wisselspanning te reel.

Dit word gedoen deur op verskillende punte van die positiewe gedeelte van die wisselspanning 'n beheerpuls aan die poort te gee. Dit wil sê, as die beheerpuls by tydstip T (fig. 2e) gegee word, sal die hele positiewe gedeelte deur die SBG gaan. As hierdie beheerpuls op 'n latere tydstip as T (fig. 2d en e) aangelê word, sal die positiewe gedeelte wat deurgelaat word kleiner wees omdat die SBG eers later begin gelei.

Omdat die SBG slegs die positiewe gedeeltes van die wisselspanning deurlaat, ontstaan hier 'n energieverlies wat ons kan ophef deur byvoorbeeld

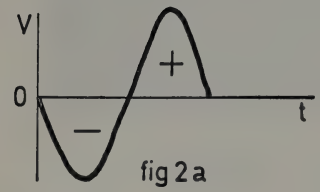


fig 2a

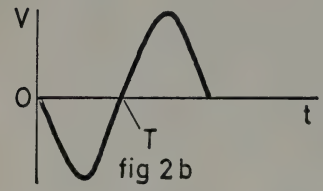


fig 2b

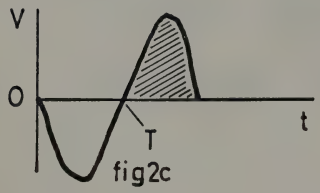


fig2c

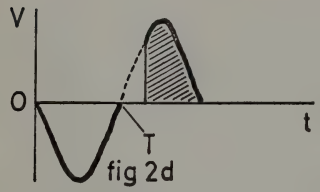


fig 2d

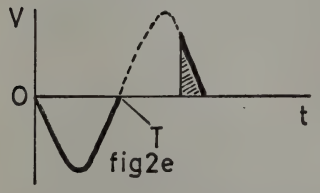


fig2e

Figuur 1: Diagrammatiese voorstelling van 'n SBG.

Figuur 2: a. 'n wisselspanning
b. tydstip T
c. positiewe gedeelte van wisselspanning deurgelaat deur SBG wanneer op tydstip T gevuur
d. na tydstip T
e. nog later as tydstip T

Figuur 3: Diagrammatiese voorstelling van 'n TRIAC

Figuur 4: Die beheerdiode

Figuur 5: Die beheer van die positiewe en negatiewe gedeeltes van 'n wisselspanning met behulp van 'n TRIAC

Figuur 6: TRIAC-stroombaan om die spoed van 'n elektriese motor te beheer

Figuur 7: SBG-stroombaan vir spoedbeheer van 'n windskermveër van 'n motor, in hierdie stroombaan het die transistor die funksie van die beheerdiode oorgeneem.

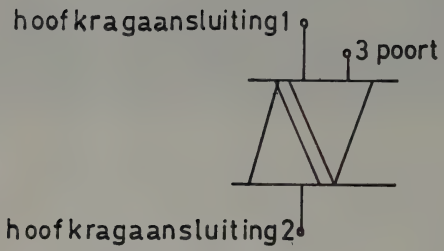


fig3

fig4

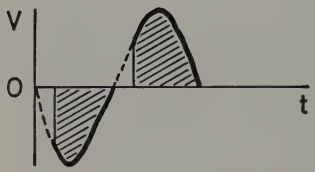


fig5

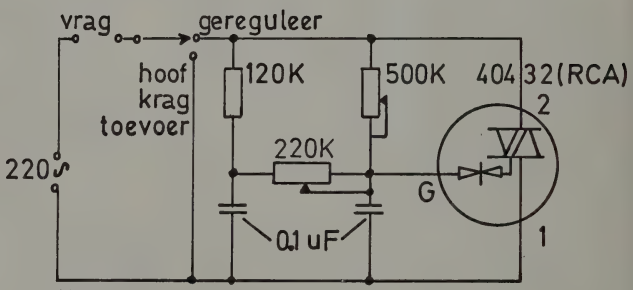


fig6

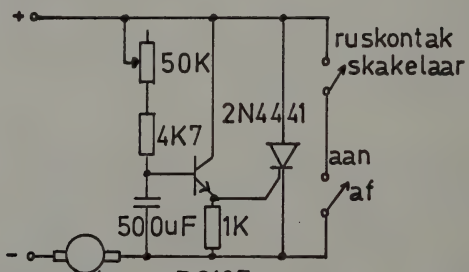


fig7.

'n tweede SBG anti-parallel aan die eerste te skakel of deur volgolf gelykrigting toe te pas.

Gelukkig is daar soos gewoonlik ook hier weer 'n halfgeleier aanwesig wat die skakeling baie vereenvoudig en wat beide helftes van die wisselspanning reël, naamlik die TRIAC.

Die TRIAC is eintelik niks anders as twee SBG's wat anti-parallel geskakel is nie, soos in fig. 3 aangetoon.

Die TRIAC kan beide helftes van die wisselspanning deurlaat en beheer, mits dit op die regte tydstip deur 'n spesiale diode (die beheerdiode) geleidend gemaak word.

Hierdie beheerdiode bestaan uit drie skyfies silikon, saamgestel soos in figuur 4 aangetoon. As 'n positiewe potentsiaalverskil oor die diode aangelê word en stadig vergroot word, sal dit by 'n bepaalde waarde die sogenoemde drumpelspanning, geleidend word. As die rigting van die spanning omgeruil word sal die diode weer by die drumpelspanning geleidend word, maar nou in die teenoorgestelde rigting. Dit is juis hierdie effek wat nodig is om 'n TRIAC op die juiste moment geleidend te maak. Tewens, die diode moet sodanig gekies word dat dit aan 'n gegewe TRIAC die juiste beheerpuls sal gee wat betref grootte van stroom en spanning.

Omdat die TRIAC beide helftes van die wisselspanning reël (sien fig. 5) kan dit aansienlike drywing beheer en is daar TRIACS beskikbaar wat 1,000 watts en meer kan hanteer.

Dit het die verdere voordeel dat min komponente vereis word en dat dit baie betroubaar is behalwe in die geval van 'n kortsluiting.

Enkele Toepassings:

a. Gereguleerde Kragbron

In fig. 6 word 'n stroombaan gegee waar 'n TRIAC gebruik word om die spoed van 'n elektriese boormasjien te varieer. Dit kan besonder gerieflik wees as mens bv. 'n spoel wil draai en 'n lae toertal vereis.

Dit kan ook die spoed van 'n naaimasjien-motor varieer, die ligintensiteit van 'n gloeilamp beheer, ens.

b. Windskermveër-reëlaar

Soortgelyk word een van die vele toepassings van die SBG gevind in die stroombaan soos gegee in fig. 7. Hier word dit gebruik om die spoed van 'n windskermveër te varieer. Dit kan gerieflik wees as dit saggies reën en die windskermveër nie sy oorspronklike spoed nodig het hom die windskerm skoon te vee nie.

Die afskakeling van die SBG geskied deur die ruskontakskakelaar van die windskermveërmotor self. Hierdie skakelaar word gebruik om die SBG kort te sluit en sodoende af te skakel. Sodra die skakelaar geopen word, kan die SBG weer gelei.

Daar is in hierdie artikel gepoog om 'n kort oorsig te gee van die beginsels en toepassings van SBG's en TRIACS. Indien daar voldoende belangstelling sou wees, kan daar in verdere artikels meer interessante toepassings van hierdie halfgeleiers gegee word en kan ook andere elemente bespreek word.

ZS6AJS

Literatuur: RCA Transistor manual, Sc13
GE Application note, 201.7
Elektuur, April 1968.

Silent Keys

KOSIE CONRADIE ZS4HF

Die Suid-Afrikaanse Radio Liga en ook ons tak het 'n staatmaker verloor met die afsterwe van Kosie Conradie ZS4HF.

Die OK het al 'n paar jaar met sy gesondheid gesukkel. Hy was nog altyd volmoed, selfs na sy bevoerte-aanval van verlede jaar. Toe ek hom in die hospitaal besoek, het hy nog van sy planne gepraat wat hy wou uitvoer sodra hy weer gesond was. Die paar kerewat ek hom vanjaar opgesoek het, het hy nie so goed gelyk nie. Ek dink hy het die QSO's met ou vriende baie gemis. Maandagaand, 14 April, is hy skielik heengegaan.

Aan sy weduwee, Maureen, wie se gesondheid ook erg geknak is 'n paar maande gelede — bied ons ons opregte deelneming mee. Ook aan die seuns en ander oorlewende familielede.

OK Kosie, was, op enkele jare na, twintig jaar lid van die Liga. Toe hy by die Tak aansluit, was onder die aktiewe lede sulke bekende amateurs soos Bill Brown, Tiny Pitts, Oom Jannie ZS4DC, Lappies ZS4EX, Willie ZS4EZ, Bob van der Hoven. Kosie het nie baie gepraat nie, maar 'n mens kon met aandag luister as hy tydens in vergadering op die been kom.

Hy was 'n geurige experimenteerder, oor die lug 'n hoflike geselser wat altyd die SARL — kode nagestreef het. Beskeie soos hy was, het hy nie graag self 'n Bulletin waargeneem nie. Maar vir jare het hy gereëld elke Sondag ons bulletin herlei, meestal op 40 meter. 'n Stuk of vyf jaar gelede het Hoofbestuur, op aanbeveling van ons Tak, die Jack Twine toekenning aan hom gedoen. Daarop was by baie trots.

Ons gun hom 'n soete rus. In ons herinnering sal hy nog lank bly voortlewe.

Pietie ZS4JZ
Tak Vrystaat, Bloemfontein.
18 April, 1969.

HOW CLEVER ARE YOU?

Read the following sentence:

FINISHED FILES ARE THE RESULTS OF YEARS OF SCIENTIFIC STUDY COMBINED WITH THE EXPERIENCE OF YEARS.

Now count aloud the F's in the sentence above.
Count them ONLY ONCE — do not go back and count them again.
The answer appears on page 26.

USING A T NETWORK

By JOHN J. SCHULTZ, W2EEY/1

The Pi-network is familiar to all as a circuit used in most transmitter output stages and unbalanced type antenna tuners. A 'T' network tuner, which employs the same elements as a pi-network but in a different circuit arrangement, has definite advantages over the pi-network when a match to very short antennas is required.

THEORETICALLY, whenever two impedances are matched by a 3 element reactive network of either the pi or T configuration, (fig. 1) the losses should be the same whichever network form is used. Intuitively, this is understandable since complementary current and voltage relationships must exist regardless of the network used if the terminal impedances are to be properly matched.

In practice, however, various other factors enter the situation which may upset this idea of equality. For one thing, the dissipative losses in various reactive elements is different, generally lower in variable capacitors, for instance, than in large inductances. The physical size, cost, *etc.*, of the practical elements needed to match a given set of impedances may also make one form of circuit more desirable than another.

The pi-network has received deserved acceptance as a versatile and generally easily adjustable form of matching network. Details of its construction is well documented in many articles and handbooks and will not be repeated here. One sees for less usage, however, of the T form of matching circuit and yet for the proper application, it can be more useful than the pi-network. The purpose of this article is not to present any detailed theoretical discussion of the T network, but to generally explore the conditions under which it is useful and to give some values for practical circuits.

* 40 Rossie, Mystic, Connecticut 06355.

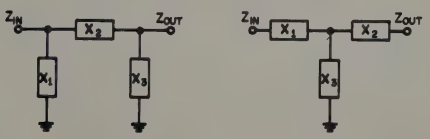


Fig. 1—Theoretically the losses using a 3 element reactive network will be the same for a given impedance match for either a pi or T network.

Basic T Network

The T network can be visualized as a combination of L networks, the same as the pi-network, Figure 2(A) shows the usual L network and the pi-network. The pi-network can be formed by connecting another L network, reversed and following the first L network. The T network can be formed by connecting another L network, reversed, but preceding the first L network.

For a given impedance transformation, the values of the two reactances (in ohms) which form the basic L network are equal. Therefore, while practical construction restraints usually preclude its use, there is no reason why the basic L network cannot be constructed as shown in fig. 2(B) with the reactive elements interchanged. Both pi and T network forms using this version of the basic L can also be formed as shown.

A total, therefore, of four networks (2 pi and 2 T types) can be formed, all of which can perform the same impedence matching function and all of which can be made to have the same bandwidth and harmonic reduction features.

Aside from the physical component values which result, the one pi and one T form which use two inductors are undesirable because of the losses that would take place, the cost of the inductors and the difficulty of bandswitching two inductors. The two forms which are left are the conventional pi-network and the less well known T network with capacitive legs.

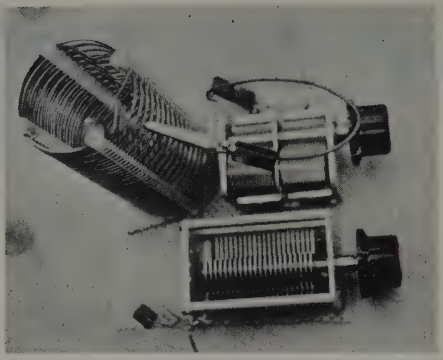
The T network for a practical matching problem, such as that for which a pi-network might be used, has the advantage that one trades some capacitance for inductance and the coil size required will be somewhat lower than for the pi-network. This factor combined with the one that less current flows through the inductive branch means that overall losses, assuming the use of good quality air variable or vacuum variable capacitors, should be somewhat lower with the T network. The difference in efficiency between the pi and T network forms becomes most noticeable when a large impedance transformation must be made (such as from a very short antenna used on a low frequency band) and when high power is used. Less loss will occur in the T matching network and, if bandswitching is employed, component requirements are less stringent. Usually one large range air or vacuum variable capacitor in each leg will suffice to cover the bandswitched network operating from 80-10 meters. Only the inductor element has to be switched and this can be done by a relatively simple and inexpensive switch since one end is grounded. The insulation requirements are reduced, especially when matching a very reactive load. In a pi-network this would require the inductor bandswitch to be well insulated from ground.

Test Circuit

Figure 3 shows the component values for an experimental T coupler built by the author and the photographs show the simple grouping of the components. No chassis construction was used since the circuit was experimental in nature and designed only to prove the coupler before later constructing a more elaborate model.

The values given for the components are such that a 50 ohm coaxial line can be matched to a highly reactive load (a 12 to 16 foot whip) over the 80-10 meter range.

The network is adjusted similarly to a pi-network with a value of inductance being chosen and then the variable capacitors used



Simple T network configuration used to check comparative performance of pi and T network using various length antennae.

for tuning and loading functions. A field strength meter should be used to determine which set of element settings gives the best efficiency although, invariably, it will be found to be the one using the least inductance with capacitor values such that the transmitter can still be properly loaded (1:1 s.w.r. on the coaxial line between the transmitter and T network).

Loading on all bands was easily achieved and with far less problems than ever would have been possible using a pi-network with such a short antenna. An exact comparison of the network performance versus a conventional pi-network was not possible because of

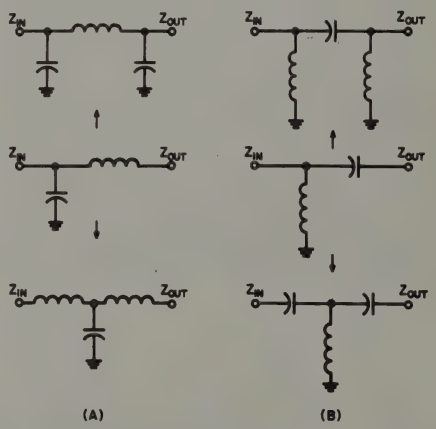


Fig. 2—The reactive values of the arms of the L network are equal in (A) and (B) for a given impedance match. One form of pi and T network can be constructed from each basic L section.

Qsy inside back cover

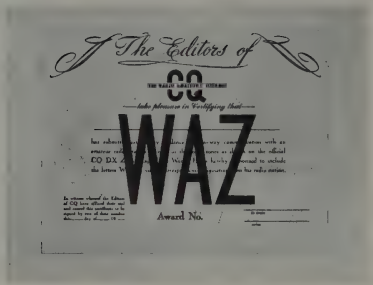
Liebe OM's von Cape Town!

Mein Name ist Ralf Pöthen, ich bin 16 Jahre alt und in Dresden geboren und wohne in Dresden. Ich bin zur Zeit im 2. Lehrjahr Facharbeiter und habe in einem Jahr mein Abitur. Mein Hobby ist die Funktechnik. Ich habe daher noch wenig Erfahrung und möchte daher mit Ihnen in regen Briefwechsel stehen. Ihre Adresse habe ich aus dem „Funkamateur", dies ist die Zeitschrift für Funktechniker. Ich habe noch andere Hobbys, zum Beispiel Ansichtskarten und Briefmarken sammeln. Was machen Sie beruflich und was ist Ihr Hobby? Wie lautet Ihre volle Adresse?
Ich hoffe, daß es zu einem regen Briefwechsel kommt.

Meine Adresse: Ralf Pöthen
DDR
8053 Dresden
Hübnerstraße 18

Mit besten Grüßen Ihr
Ralf Pöthen

COMPLETE WAZ RULES



The WAZ Award will be issued to any licensed amateur station presenting proof of contact with the forty zones of the world. This proof shall consist of proper QSL cards to be checked by the DX Editor or verified at one of the authorized checkpoints for *CQ* DX Awards. Most of the major DX clubs of the USA and national amateur radio societies abroad can be authorized checkpoints if they clear in advance with K4IIF. If in doubt consult the DX Editor. Any legal type of emission may be used providing communication was established after Nov. 15, 1945.

1. The official *CQ* WAZ Zone map will be used in determining zone boundaries.

2. Confirmations must be accompanied by a list of claimed zones showing the call letters of the station QSOed and the mode. The list should also show the applicants name, call letters, and complete mailing address clearly.

3. All contacts must be made with licensed, *land based*, amateur stations working in authorized amateur bands.

4. All contacts submitted by the applicant must be made within a 250 mile radius of the original location.

5. Any altered or forged confirmations will result in permanent disqualification of the applicant.

6. Continued use of poor operating ethics will result in disqualification of the applicant.

7. In addition to the conventional certificate for which any and all bands and modes may be used, specially endorsed and numbered certificates are available for phone and single sideband operation. The phone certificate requires that all contacts be two-way phone and the s.s.b. certificate requires that all contacts be two-way s.s.b.

8. If, at the time of the *original* application, a note is made pertaining to the possibility of a subsequent application for an endorsement or special certificate, only the missing confirmations required for that endorsement need be submitted with the later application.

9. Include with the application $1.00 or 8 International Reply Coupons to defray the cost of the certificate.

10. Decisions of the *CQ* DX Awards Advisory Committee on any matter pertaining to the administration of this award shall be final.

11. All applications should be sent to the DX Editor, P.O. Box 205, Winter Haven, Florida 33881.

12. Zone Maps and/or WAZ applications are available from the DX Editor or from *CQ* for a self-addressed stamped envelope or self-addressed envelope and 1 IRC.

The following list of zones is presented as a guide. Any questions will be decided by the zone map.

Zone 1. Northwestern Zone of North America: KL7, VE8-Yukon, the VE8-Northwest Territories Districts of Mackensie and, Franklin, and the islands west of 102° including Victoria, Banks, Melville, and Prince Patrick.

Zone 2. Northeastern Zone of North America: VO2-Labrador, that portion of VE2-Quebec north of the 50th parallel, and a portion of the Northwest Territories-VE8 east of longitude 102°. The latter includes part of the District of Franklin and the islands of King William, Prince of Wales, Somerset, Gathurst, Devon, Ellesmere, Baffin, and the Melville and Boothia Peninsulas.

Zone 3. Western Zone of North America: VE7, W6, and the W7 states of Arizona, Idaho, Nevada, Oregon, Utah, and Washington.

Zone 4. Central Zone of North America: VE3, VE4, VE5, VE6, the W7 states of Montana and Wyoming, WØ, W9, W8 (except W. Va.), W5, and the W4 states of Alabama, Tennessee, and Kentucky.

Zone 5. Eastern Zone of North America: FP8, VE1, VO1, that portion of VE2-Quebec south of the 50th parallel, VP9, W1, W2, W3, the W4 states of Florida, Georgia, South Carolina, North Carolina, and Virginia, and the W8 state of West Virginia.

Zone 6. Southern Zone of North America: XE and XF.

Zone 7. Central American Zone: FO8-Clipperton, HP, HR, KS4, KZ5, TI, TI9, VP1, TG, YN, and YS.

Zone 8. West Indies Zone: CM/CO, FG7, FM7, HH, HI, KG4, VP2, VP5, VP7, KC4-Navassa, PJ2M/FS7, PJ2E, PJ2S, and YVØ-Aves.

Zone 9. Northern Zone of South America: FY7, HK, PJ2, PZ, VP3/8R, VP4/9Y4, and YV.

Zone 10. Western Zone of South America: CP, HC, HC8, and OA.

Zone 11. Central Zone of South America: PY and ZP.

Zone 12. Southwest Zone of South America: CE.

Zone 13. Southeast Zone of South America: CX, LU, VP8, and all Antarctic prefixes.

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Zone 15. Central European Zone: FC, HA, HV, I, IT, IS, OE, OH, OK, SP, UA2, UP, UQ, UR, YU, ZA, ZB1/9H1, 9A1.

Zone 16. Eastern Zone of Europe: UA1, UA3, UA4, UA6, UA9-Bashkir & Chkalov, UB5, UC2, UN1, and UO5.

Zone 17. Western Zone of Siberia: UA9-Sverdlovsk, Chelyabinsk, Komi, Jurgan, Molotov, Omsk, Tyumen, plus UH8, UI8, UL7, and UM8.

Zone 18. Central Siberian Zone: UA9-Novosibirsk, Tonsk, Kamerovo, and Altai; UAØ-Keasnoyarsk, Irkutsk, Chita, Bruyate Mongolia, and Dickson Island.

Zone 19. Eastern Siberian Zone: UAØ-Khabarovsk, Amur, Yakutsk, Primorsky, Sakhalin Island, Wrangel Island, and the Soviet Kuriles.

Zone 20. Balkan Zone: JY, LZ, OD5, SV, TA, YK, YO, ZC4/5B4, and 4X4.

Zone 21. Southwestern Zone of Asia: EP, HZ, MP4, 9K, VS9 (except Maldives and Socotra), YA, YI, 4W1, UD6, UF6, UG6, and AP-West Pakistan.

Zone 22. Southern Zone of Asia: AC3, AC5, CR8, 4S7, VU (except Andaman and Nicobar Islands), 9N1, and AP-East Pakistan.

Zone 23. Central Zone of Asia: AC4, the BY provinces of Sinkiang, Kansu, and Hinghai, JT1, and UAØ-Tanna Tuva.

Zone 24. Eastern Zone of Asia: BY (except the provinces in Zone 23), BV, CR9, and VS6.

Zone 25. Japanese Zone: HL/HM, JA/KA, and KR6.

Zone 26. Southeastern Zone of Asia: HS, XV, XW, XZ, 3W8, and VU2-Andaman and Nicobar Islands.

Zone 27. Philippine Zone: DU, KC6, and KG6.

Zone 28. Indonesian Zone: CRØ, VR4, VK9 (except Nauru, Norfolk Is., and Christmas Is.), VS1, VS4, VS5, ZC5, 8F, and 9M.

Zone 29. Western Zone of Australia: VK6, VK8, and VK9-Christmas Is.).

Zone 30. Eastern Zone of Australia: VK1, VK2, V3, VK4, VK5, VK7, and VKØ-Macquarrie Is.

Zone 31. Central Pacific Zone: KB6, KH6, KJ6, KM6, KP6, KW6, KX6, VK-Nauru, VR1, VR3, and ZM7.

Zone 32. New Zealand Zone: FK8, FO8 (except Clipperton), FU8/YJ, KS6, VK9-Norfolk Is., VR2, VR5, VR6, ZK1, ZK2, ZL, and 5W1.

Zone 33. Northwestern Zone of Africa: CN2, CN8, CT3, EA8, EA9, 3V8, and 7X.

Zone 34. Northeastern Zone of Africa: ST, SU, and 5A.

Zone 35. Central Zone of Africa: CR4, CR5-Guinea, EL, TU, TY, TZ, XT, ZD3, 5N2, 5U, 5V, 6W8, 9G1, and 9L1.

Zone 36. Equatorial Zone of Africa: CR5-Sao Thome, CR6, EAØ, TJ, TL, TT, TN, TR, 9Q5, 9U5, 9J, ZD7, and ZD8.

Zone 37. Eastern Zone of Africa: CR7, ET2, ET3, FL8, 6O1, 6O2, 5H3, 5X5, 5Z4, and 7Q7.

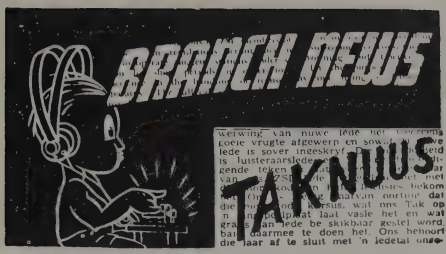
Zone 38. South African Zone: ZD9, ZE, and ZS.

Zone 39. Madagascar Zone: FB8, 5R8, FR7, VQ8, VQ9, and VKØ-Heard Is.

Zone 40. North Atlantic Zone: LA-Jan Mayen, LA-Svalbard, OX, TF, and UA1-Franz Joseph Land.

The UA9 and UAØ Zones are sometimes rather hard to determine. However, the DX column in the June issue has a handy table to use in locating stations in these zones.

Members must apply for application forms
to HEADQUARTERS, P.O. Box 3911, Cape Town.



TAK NOORD-TRANSVAAL

Oor die naweek van 26/27 April 69, het Tak Noord-Transvaal 'n baie geslaagde Saamtrek by Rondalia se Warmbron, net wes van Naboomspruit, gehou. Toe dit weer skielik Donderdag net voor die saamtrek swart oor Pretoria begin opbou, en fyn hael en emmers vol reën oor Pretoria begin uitsak, het dit vir baie van ons gelyk asof die saamtrek op die grootste mislukking van die jaar sou uitloop. OK Tiennie ZS6BAN en sy LV Mercia het reeds twee dae vroeër na die Bron vertrek en het byna die hele pad in die reën afgelê. By Vrydag het die weer egter begin opklaar, maar ons het darem so in die stilte lelik geknyp net ingeval dit weer sou begin reën.

Een na die ander het die OK's en hul families begin opdaag sodat daar by Saterdag nie minder as 35 gelisensiëerde amateurs plus hul LVs en juniors by die samekoms was nie. Ons het sowat 25 rondawels betrek. In die meegaande foto wat deur OK Gert Terblanche ZS6BIK geneem is, verskyn 32 van die OKs wat die vergadering bygewoon het. OK Dup van Pretoria-Tak het ook saam met ons vergadering kom hou. OK Heyns ZS6NS het die vergadering opgeluister met 'n baie interessante praatjie oor die nuwe ontwerprigting wat tans besig is om in die radiowêreld te ontwikkel.

Net na afloop van die vergadering was daar 'n rommelverkoping van radiotoerusting wat die OKs gretig opgeraap het. So skuins oor ses het die braaivleisvure begin opvlam. Dit was 'n aardigheid om die OKs en hul families om die vure dop te hou. Aan die grappies en grootbekstories was daar geen end nie. Veral daardie OKs wat van veraf gekom het en mekaar net eenmaal per jaar van aangesig tot aangesig sien, het baie gehad om oor te gesels; andere wat alleenlik bekendes op die lug was, het mekaar daar vir die eerste maal in lewende lywe kom ontmoet. Die gees was net te wonderlik en ek dink dit sal nog sommer lank duur voordat die OKs uitgesels sal wees oor die aangename ure wat hulle daar saam deurgebring het. Daardie Saterdagnag om twee-uur was 'n hele aantal aan hulle nog altyd aan die baljaar in die swembad.

Die Sondag het OK Bennie Schoeman ZS6ABS die weeklikse bulletin vanaf sy tuisstasie te Nylstroom uitgesaai. By daardie tyd was die meeste van ons al reeds weer op pad huistoe en kon baie van die OKs wat mobiele toerusting in hul vuurwaens gehad het aan OK Bennie terug rapporteer.

'n Spesiale komitee was aangewys om al die mobiele stasies van OKs wat die saamtrek bygewoon het, te beoordeel. Na 'n baie strawwe beoordeling het die lot op OK Tinus ZS6TL geval. Dié van u wat sy tuisgeboude stasie gesien het en die hoë gehalte van sy uitsendings gehoor het, sal dadelik verstaan waarom die beoordeelaars die prys aan hom toegeken het. Van harte geluk Tinus. Jy het die prys beslis verdien.

Ons heet OK Karel Jordaan ZS6BCM van Pietersburg baie hartlik welkom as nuwe lid van ons Tak. Vroeër was hy

lid van Tak Oos-Transvaal. Ook wil ons baie hartlik geluk sê aan OK Brink ZS6NK en sy LV Ita ZS6PX met hul splinternuwe kleindogter Ita wat op 11 April die eerste lig gesien het. En terwyl ons besig is om mekaar geluk te wens is ek bly om ook OK Chicot ZS6BLJ se LV Jannie van Harte te filisiteer met die toekenning aan haar verlede week van die graad BA Hon.

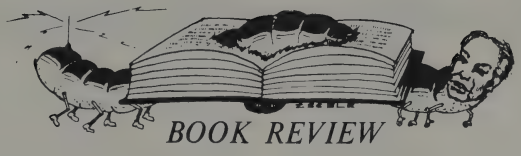
Ons voorsitter OK Chris ZS6AIN het op 11 April vanaf Pretoria na sy nuwe QTH te Kemptonpark verhuis en hy het reeds daarvandaan op ESB op bulletin gerapporteer. OK Hennie Steynberg ZS6BLT het homself weer eens bereidwillig verklaar om die amp van ouditeur vir die Tak te aanvaar. Ons sê baie dankie Hennie.

Pretoria-Tak het Tak Noord-Transvaal uitgenooi om op Donderdag-aand saam met hulle vergadering te kom hou. Ek hoop dat daar sommer baie van ons lede sal wees wat in staat sal wees om die uitnodiging te aanvaar.

Vir algemene kennis maak ons graag vroegtydig bekend dat Tak-Noord-Transvaal weer besig is om 'n Saamtrek Op Die Lug vir die Voortrekkers te organiseer. Die komitee wat namens TNT met die Voortrekkers sal skakel bestaan uit OKs Willie ZS6BDM, Chicot ZS6BLJ en Roelf ZS6ATK. 'n Vriendelike dog dringende beroep word op alle OKs dwarsdeur die Republiek gedoen om asseblief hul dienste aan die Voortrekkers beskikbaar te stel indien daar op hul nommer gedruk word. Hopelik sal die saamtrek weer soos in die verlede gedurende Oktober plaasvind. Die datum sal later in Radio ZS bekendgemaak word. Groete.

Tienie ZS6BAN

Foto deur O.K. Gert Terblanche ZS6BIK



BOOK REVIEW

by Colin Duff ZS1CA

TAB BOOKS No. 493. Title: Semi-conductors: A to Z. by Phillip Dahlen Published January 1969.

Here is a new book of 272 pages dealing with transistors and semiconductors written in language anyone can understand. As is pointed but by the Author, it is not necessary to understand the precise atomic principles of semiconductors to successfully trouble shoot or repair solid-state equipment. As these matters really concern chemists, physicists and other scientists, the Author's approach is very down to earth in the books many chapters.

The content begins with a review of how basic semiconductors work, how a transistor conveys a signal, transistor biasing, effects of temperature on operation, factors limiting transistor frequency response, etc. Succeeding chapters delve into the mystical arena of field-effect transistors by explaining the difference between FET's and regular transistors; junction FET applications, depletion-type and enhance ment type MOS FET's. Attention is also given to integrated circuit applications, unbalanced differential amplifiers, IC applications in FM and TV receivers, and cascade amplifier networks. The Diode family of field-effect diodes, zener diodes, SCR diodes, diacs and triacs and also discussed at length. Last but not least chapters on the principle of Optics and Optic-Electronic Couplers which includes the principle of a needle-less Gram pick-up that plays Standard records.

This book undoubtably does cover semiconductors from A to Z and has all one needs to know in this field. Binding is either hard or paperbound, the latter being priced at $4.95 in U.S. Dollars.

On Tuesday 21-4-69, at its first meeting of the new Council year, the following office bearers were elected for the ensuing year:— President of the League, and Chairman of Council — H.M. Wilson, ZS1BF; Vice-President and Vice-Chairman — C. Duff, ZS1CA; Hon. Secretary — Mrs. A.H. v.d. Merwe, ZS1AZ; Hon. Treasurer — J. Timoney, ZS1TK; QSL Manager — J.E.J. v.d. Merwe, ZS1AW; Awards & Certificates Manager — J.G. Gerryts, ZS1VA; Branch Affairs — C. Duff, ZS1CA; H.Q. Notes — H. Forrer, ZS1FT.

The appointment of a Call Book Editor was held over to the following Council meeting as details of the offers which had been made at the A.G.M. were awaited.

In the meantime Mr. E.H. Rhodes, ZS1R, would continue to act as Editor. The appointment of an Editor for Radio ZS was not made as the present arrangements for the production of Radio ZS, were proving satisfactory.

H.K. NOTAS

Op Dinsdag 21 April, 1969, op die eerste Hoofraadsvergadering van die nuwe ampstermyn, is die volgende ampsdraers gekies:— President van die Liga, en Voorsitter van Hoofraad — H.M. Wilson, ZS1BF; Vise-President en Vise-Voorsitter — C. Duff, ZS1CA; Eresekretaresse: Mev. A.H, v.d. Merwe, ZS1AZ; Eretesourier — J. Timoney, ZS1TK; QSL Bestuurder — J.E.J. v.d. Merwe, ZS1AW; Toekennings and Sertifikate — J. Gerryts, ZS1VA; Takaangeleenthede — C. Duff, ZS1CA; H.K. Notas — H. Forrer, ZS1FT.

Die aanstelling van 'n Roepseinboek Redakteur sal oorstaan tot die volgende Raadsvergadering, daar besonderhede van voorstelle gedoen by die onlangse A.J.V. nog afgewag word. Mnr. E.H. Rhodes, ZS1R sal voorlopig as Redakteur waarneem. Die aanstelling van 'n Redakteur vir Radio ZS, is nie gedoen nie, daar die huidige reëlings vir die produksie van Radio ZS bevredigend voorkom.

Jack Twine Merit Award

It is with great pleasure that we have to announce that OM Stan Herbert, ZS5OA, of the South Coast Branch has been awarded the Jack Twine Merit Award. Our heartiest congratulations to you OM Stan.

Radio ZS

Ons gelukwense aan OK Ray Alexander, ZS1IM, en sy bekwame Komitee vir die wonderlike poging aangewend en die wyse waarop Radio ZS nou weer verskyn. Ons weet dit kos harde werk, en soms onder moeilike om-

standighede. Wees verseker dat julle pogings deur al die lede hoog op prys gestel word. Ons verneem dat OK Christo Viljoen, ZS1HC, moontlik weer sy gewig gaan instoot om meer Afrikaanse Tegniese artikels in Radio ZS te laat verskyn. Die rede hoekom OK Christo vir so 'n lang ruk stil was word toegeskryf dat hy aan sy dokters graad gewerk het, en nou ook verwerf het. Namens die lede baie hartlik geluk met hierdie groot prestasie. Ons sien uit na die artikels in Radio ZS.

Roepseinboek

Lede word vriendlik versoek om adresveranderings of moontlike foute onder ons aandag te bring by Posbus 3911, Kaapstad, daar Radio ZS maandeliks 'n lys van amendamente en toeveegings sal plaas.

Callsign Book

Members will find a list of amendments and additions printed monthly in Radio ZS. If you have changed your address please notify H.Q. at P.O. Box 3911, Cape Town.

Venue for the next A.G.M.

Up to the time of writing H.Q. Notes no further news has been received about the venue for the next A.G.M. It would appear that the Cape Town Branch may be interested if nothing is heard from the branches concerned.

Council News

Rumours have it that OM Koos v.d. Merwe ZS1AW is going on pension next year, and might be leaving the Cape. This will be a double loss for the League as we will then also lose his XYL Annie v.d. Merwe, ZS1AZ, our very efficient Hon. Secretary at H.Q. These two members served H.Q. so long that they are considered part of the fixtures and fittings. As it will be very difficult to replace these faithful work-horses, it would be wise for the members to think about nominations to replace Koos and Annie, even at this very early stage. I hope the rumours are completely untrue and they will settle at the Cape and carry on the very good work for the S.A.R.L.

It has been confirmed that the recent newspaper poster "Wilson Threatens to Resign" has no connection with the President of the League OM Willie Wilson. Apart from his recent bout of flu, all is well with him.

Die volgende lede is gekies om te dien op die Komitee van die Oos Transvaalse Tak:

Voorsitter:	Jannie du Preez, ZS6ZF
Vise-Voorsitter:	Johnny Sauermann, ZS6BGT
Eresekretaris:	Lydia Bierman, ZS6-044
Komitee:	George Heine, ZS6ABV, Emile Saad, ZS6AWO; Ben van den Bergh ZS6BDU; Chris Malherbe, ZS6ASU, Hennie Scheepers, ZS6AUC.

Die nuwe S.W.A. Tak se Komitee is as volg:—

Voorsitter:	Pieter Smart, ZS3BS
Sekretaris:	Sakkie Bláauw, ZS3-044
Tesourier:	Hans Fischer, ZS3HF
Lede:	Werner Franke, ZS3LU
	Ian Sutherland, ZS3C

Namens ons lede wens ons die gekose Komitee lede geluk met hulle verkiesing en ook ons dank aan die uittredende lede, vir die goeie werk deur hulle gedoen vir hulle onderskeie takke en die Liga.

New and Re-instated Members

We wish to welcome the following new and re-instated members to our ranks and hope that they will be with us for many years:

Cape Town Branch

ZS1-018	D. F. Worthington-Fitnum
ZS1BK	T. Freeborough
	J. Webster
ZS1JX/DJ5GC	P. Jendrissek
	F. Segall
	P. M. Atkinson

East Rand Branch

ZS6SU	K. J. Bonow
ZS6AJL	L. Frieenthal
ZS6MG	D. M. Gropper
OE5ACL	K. H. Ahamer
ZS6-012	T. Khan
ZS6-017	C. J. Carr

Port Elizabeth Branch

ZS2-079	D. C. Le Grange

East London Branch

ZS2A	A. D. Boyle

Tak Noord Transvaal

ZS6LQ	H. Cloete

Northern Johannesburg Branch

ZS6-413	M. V. Hoff
ZS6-414	N. H. Smith

Johannesburg Branch

ZS6AQO	J. Sultz
ZS6-196	P. A. Robertson
ZS6BBL	J. S. Lengton
ZS6BH	R. A. Bosnier

Pretoria Branch

ZS6-273	C. A. Levienson
ZS6PB	F. J. Potgieter
ZS6BFW	O. W. Griffiths
ZS6BGE	A. H. du Plessis

We are informed by OM Jan, ZS6BBK, that he has undertaken the handling of QSL's for ZS1AMB (ZS6BCT) for the duration of the 10th South African Antarctic Expedition. QSL cards may be despatched through our S.A.R.L. Qsl Bureau.

Illegal Call Signs

Calendar number 77 of the International Amateur Radio Union contains a request from the Indonesian Telecommunications Council asking all member societies of the I.A.R.U. to refrain from contacting stations using the prefix PK8, as this prefix is illegal and would only be used by pirate stations.

At the same time they call attention to the improper use of a number of prefixes by amateurs in certain countries on the A.R.R.L. Countries list and urge member societies of the Union, where appropriate, to recommend the correct use of amateur prefixes. The following prefixes do not conform to the Table of Allocation of International Call Signs, as shown in paragraph 747 in the Radio Regulations, Geneva 1959.

AC Bhutan (There is no official prefix for this country).

AC3 Sikkim (There is no official prefix for this country).

AC4 Tibet (There is no official prefix for this country).

FO8M Maria Theresa (There is no official prefix for this country).

M1 San Marino (The prefix 9AL is official).

PX Andorra (The PX series is assigned to Brazil. There is no official prefix for Andorra).

601,2,6 Somali (Para 761 (d) states that, for amateur stations combinations commencing with a digit should not be used when the second character is the letter U or the letter I).

IM Minerva Reefs (There is no official prefix for this Country).

IS Spratley Island (There is no official prefix for this Country).

7GI Guinea (7G series is assigned to Indonesia. Correct prefix is 3X).

73,

Herman Forrer, ZS1FT

AMENDMENTS TO CALLBOOK No. 22

*ZS1HF	H. F. Randall, c/o P.O. Box 2460, Durban.
*ZS1JJ	J. T. Clegg, 5 Columbus Road, Newlands, Cape.
*ZS1PD	P. D. De la Guerra, Tegnikus, Poskantoor, Riversdal, K.P.
*ZS1PM	John R. Blackman, P.O. Box 1020, Cape Town.
*ZS1RJ	Hector Cloete, delete, see ZS6LQ.
*ZS1RV	W. A. (Oscar) van Schoor, Green Acre, Sea View Road, Somerset West. C.P.
*ZS1TF	J. C. Bastiaans, Post Office, Bredasdorp, C.P.
*ZS1UP	I.F. Gerdes, Radio Service House, Trust House, 20 Main Road, Plumstead.
ZS1WR	C. J. Olivier, Poskantoor, Nababeep.
*ZS1YW	G. V. Osborne, 1 Alamein Street, Claremont, Cape.
*ZS3CJ	Chris J. Le Roux, Rosh Pinah, Oor Aus. S.W.A.
*ZS4FM	I. Norval, Vermeulenstraat 60, De Aar, K.P.
ZS4HF	J. P. Conradie — delete — deceased.
*ZS4MK	Louis E.J. Peacock, 2 Vels Street, Panorama, Kroonstad, O.F.S.
ZS4UP	J. J. Ayres, delete — see ZS5UP.
ZS4VU	Mrs. J.M.J. Peacock, 2 Vels Street, Panorama, Kroonstad, O.F.S.
*ZS5BN	W.R.A. Perfect, 32 Albemarle Court, Old Fort Road, Durban.
*ZS5BP	Miss Pearl Pearce, 178 Uitlander Street, Vryheid, Natal.
*ZS5BS	M. H. Roseveare, should read — Montclear.
*ZS5DC	H. Overgaard, should read 3 Hillfield Court.
*ZS5HA	should read C.D. Dunning.
ZS5HI	J. Brown, should read 66 Willern Court.
*ZS5HM	should read E. Houston-McMillan.
ZS5KH	delete.
ZS5KY	D. E. Puren should read Durban, not Durban North.
ZS5LF	delete — see ZS6AN.
*ZS5MK	Louis E.J. Peacock, delete (See ZS4MK)
*ZS5NK	Gary M. Potgieter, 17 Hillside Crescent, Cowies Hill, Natal.
*ZS5OA	S.A.W. (Stan) Herbert, P.O. Box 153, Margate, Natal.
ZS5PX	Tim W. Anderson, c/o T. Connock, P.O. Box 2692, Durban.
*ZS5QK	R. V. Kottich, 7 Rapson Road, Northdene, Natal.
ZS5RB	T. B. Holmes, delete, now WA5RIC.
*ZS5RX	P.D. Linington, should read P.O. Box 82.
ZS5SE	S. E. Busby — Silent Key.
ZS5SU	W. A. Arnold, 58 Bowker Road, Escombe, Natal.
*ZS5UP	J.J.C.Ayres,7 Pinefern, Payne Street, Pinetown. Natal.
ZS5VU	Mrs. J.M.J. Peacock — delete (see ZS4VU).
*ZS5WU	F. W. Unstead, 42, Churchill Road, Athlone Park, Umbogintwini, South Coast, Natal.
ZS5XX	B. Dale — delete, lives in Australia.
ZS5Y	P. Peyton — delete "Fremation" add "Tremation".
ZS5YC	delete (see ZS5YL).
*ZS5YL	Mrs. E.E. Baumann, Glen Echo Ranch, P.O. Box 269, Estcourt, Natal.
*ZS5YM	K.O. Baumann, Glen Echo Ranch, P.O. Box 269, Estcourt, Natal.
ZS5YS	Basil C. Warren, delete "Durban" and add "Natal".
*ZS5ZS	Ronald E. Tester, 1 Wilson Drive, Pinelands, Pinetown, Natal.

Amendments to Callbook (cont'd)

*ZS6AIO	S. E. Engelbrecht, 45-4th Avenue, Bez Valley, Johannesburg.
*ZS6AJW	Denis N. Orchard, 2 Orchard Road, Primrose Hill, Germiston, Tvl.
*ZS6AJY	B. E. Brokensha, 70 Meath Street, Oakdale, Bellville.
*ZS6ALM	P.P.B. Hutchinson, 16 Los Angeles Court, Cor. Paul Nel & Banket Sts., Hillbrow,
*ZS6BDD	Arno J. du Plessis, Tweedyweg 172, Brenthurst, Brakpan. Joburg.
*ZS6BDS	V. B. (Mac) MacDougall, P.O. Box 155, Florida, Tvl.
*ZS6AB	Dr. B. Serebro, P.O. Box 47096, Parklands, Johannesburg.
*ZS6DI	J. O. Grobbelaar, P.O. Box 2612, Mellville, Johannesburg.
*ZS6L	Major G. Ross-Kent (Joss) 45 Parklane Mansions, Empire Road, Parktown,
ZS6TX	Dr. M. Alberts, S.A.I.M.R., P.O. Box 632, Pietersburg. Johannesburg.

SWAZILAND – ZD5

*ZD5B	Malcolm R. Scott, P.O. Box 255, Mbabane.
ZD5K	J. H. F. Connolly, P.O. Box 3, Piggs Peak.
*ZD5M	D. R. Vahl, P.O. Box 23, Big Bend.
ZD5P	Johannes G. Pietersen, c/o Fraser Ltd. Big Bend.
*ZD5R	V. V. Parkhouse, P.O. Box 99, Mbabane.
ZD5V	Victor Ingram, P.O. Box 541, Manzini.
ZD5X	Victor H. Thorne, P.O. Box 49, Mbabane.

HOW CLEVER ARE YOU?

There are six F's in the sentence. If you counted only three the less we say the better. If you spotted four you are of average intelligence. If you got five you will never fogive yourself for having missed one. If you found all six you are brilliant and should not be wasting your time on foolishness such as this.

Here's our choice for the month . . .

A.R.R.L. Handbook 1969	R4.85
101 Ways to Use Your Ham Test Equipment (Middleton)	2.56
Transistorized Amateur Radio Projects (Caringella)	2.90
Practical Power Supply Circuits (Shields)	2.81
RCA Silicon Power Circuits Manual	1.57
Amateur Radio Antennas (Hooton)	3.91
Single Sideband: Theory & Practice (Hooton)	5.87
Beam Antenna Handbook (Orr)	3.76
Simplified Math for the Hamshack (K8LFI)	.58
2–Way Mobile Radio Handbook (Helmi)	3.47
Designer's Guide to British Transistors (Kampel)	2.93
101 Ways to Use Your VOM & VTVM (Middleton)	2.68

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CHC CORNER

de Max Adler, ZS1ACD

CHC – FHC NEWS RELEASE-QSP FAR AND WIDE.

Announcing CHC/FHC/HTH Annual 1969 QSO PARTY open to all Hams and SWLs.

1. **Time/Date:** 2300 GMT Fri. 6 June thru Mon. 9 June, 0600 GMT, 1969.

2. **Awards:** For 1st, 2nd and 3rd place for World, Continent, Country, U.S. State, VE Province. Many special Trophies. CHCers, HTHers, Novices, B/P and SWLs are scored separately.

3. **CHCers and FHCers:** Call CQ CHC orCQ FHC; give QSO#, RPT name CHC and/or FHC#s, State and Country, (DX STNS give LAAN, DOK, Province etc.)

4. **HTHers:** All Non-CHCers are HTHers. Except for FHCers as above, call CQ HTH; give QSO#, RPT, Name HTH, State and Country or for DX as above. Novices and SWL's operate as HTHers.

5. **Scoring System**

a. **CHCers:** Contacts CHCer to CHCer is ONE point; CHCer to HTHer is TWO points. Except to Novice HTHer is THREE points; any YL contact is ONE additional point; any FHC contact is ONE additional point. Any B/P is ONE additional point.

b. **HTHers: All Non-CHCers and SWLs;** (includes FHCers who are Non-CHCers) HTH to CHC is THREE points. Except YL and b/p CHCer is five points; any FHCer is ONE additional point; HTH to HTH does not count.

c. **Same STN:** May be contacted by DIF band or mode as new contact for points. SSB and AM DIF mode.

d. **Multipliers:** Add number different Continents, Countries, VE Provinces and US States contacted; own counts; KL and KH are both State and Country. Sum Total is Multiplier.

e. **Final Score:** Multiplier times Total points is final score. If final score is not computed correctly, applicant will be disqualified for QSO Party Awards and Trophies.

6. **Frequencies:** (Plus/Minus)
CW in U.S. but CW and Phone for Non US. *3575; N3710; *7070; N7160; *14075; *21075; 21090; N21140; *28090. Phone in U.S. - Ph./CW for Non U.S. 3770; 3775; 3790; *3943; 3960; 7070; 7090; 7210; 7260; *7275; **14320; *** 14340; **21360; *21440;** 28720 ***28690; 50.35.**

Hamads

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FOR SALE:
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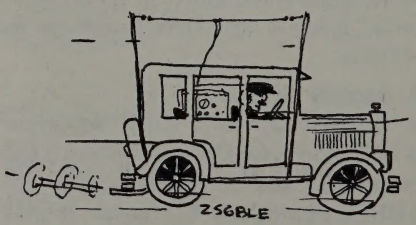

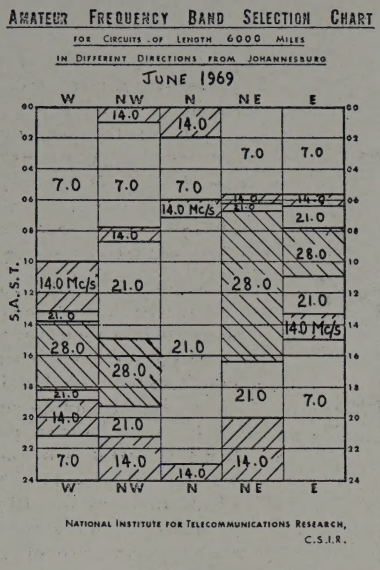

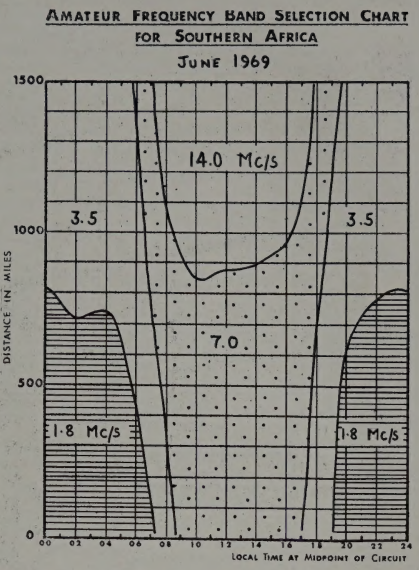

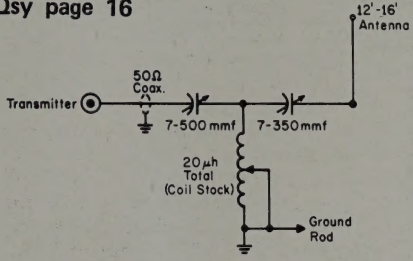

Fig. 3—T network constructed to operate into short antenna on 80-10 meters.

the time required to change and adjust the networks. The general impression, however, was that the T network was definitely superior on the lower frequency bands, 80 and 40, and this coupled with the ease of loading on these bands made us regard the experiment as a success.

On the higher frequency bands and when using an antenna of reasonably long length (¼ λ or more) there would seem to be little advantage to the T network over the pi-network. However, on the lower frequency band and when using a very short antenna, the T network appears to be of definite advantage.

This form of antenna coupler has already been used by commercial equipment manufacturers where, for instance, a high-powered mobile transmitter must be matched to a short whip which could not be inductively loaded because of the possibility of damage to the loaded whip due to physical factors. The approach may be very useful for amateur mobile operation on the lower frequency bands by having a well constructed T network in the trunk of a car and eliminating the inductive loading of the whip antenna. The increased efficiency of the T network may well compensate for the improvement in efficiency achieved by center-loading versus base-loading of the whip and so one could have still efficient mobile installation (as far as mobile installation efficiencies go, anyway) without a costly and conspicuous antenna structure. Otherwise, the T network should also be useful in a fixed or portable situations for anyone constrained by a short antenna on the lower frequency bands.

As with any antenna coupler, the practical efficiency depends upon the quality of the components used. Fortunately, with the T network this is not difficult to achieve since the component values are such that readily available parts can be used. If possible, fixed capacitors should not be shunted across the variable capacitors to increase the total capacity, since unless expensive transmitting mica types are used, they will degrade performance. For low power installations (up to a few hundred watts) the inductor wire size can be #12 or #14. For higher-power installations, the inductor should be made of 3/16 to ¼ inch tubing. In the latter case, for a given installation, the inductor value required can be determined using very low power and a small wire-size inductor and then the larger inductor constructed according to the values found. ■

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